Asia's 50 top electronics companies expect a flat '92
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How to navigate the client/server market
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Electronics bankruptcy rates post another high
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A CAHNERS PUBLICATION

Electronic Business®

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES—WORLDWIDE

OCTOBER 1992

SPECIAL QUALITY ISSUE

FINALLY, THE PIECES COME TOGETHER

After years of trying, industry finds some answers to the quality puzzle:

How to make the Baldrige work
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Measuring return on quality
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Gauging customer satisfaction
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AT&T has two divisions in the Baldrige hunt
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Electronic Business

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Its many critics dismiss it as an expensive and meaningless beauty contest. The evidence, though, suggests that the award has finally added some much-needed structure to decades of unfocused corporate energy. In the process, it has snapped the electronics industry out of its long-standing complacency about product quality and customer satisfaction

Cover illustration by Tom Szumowski

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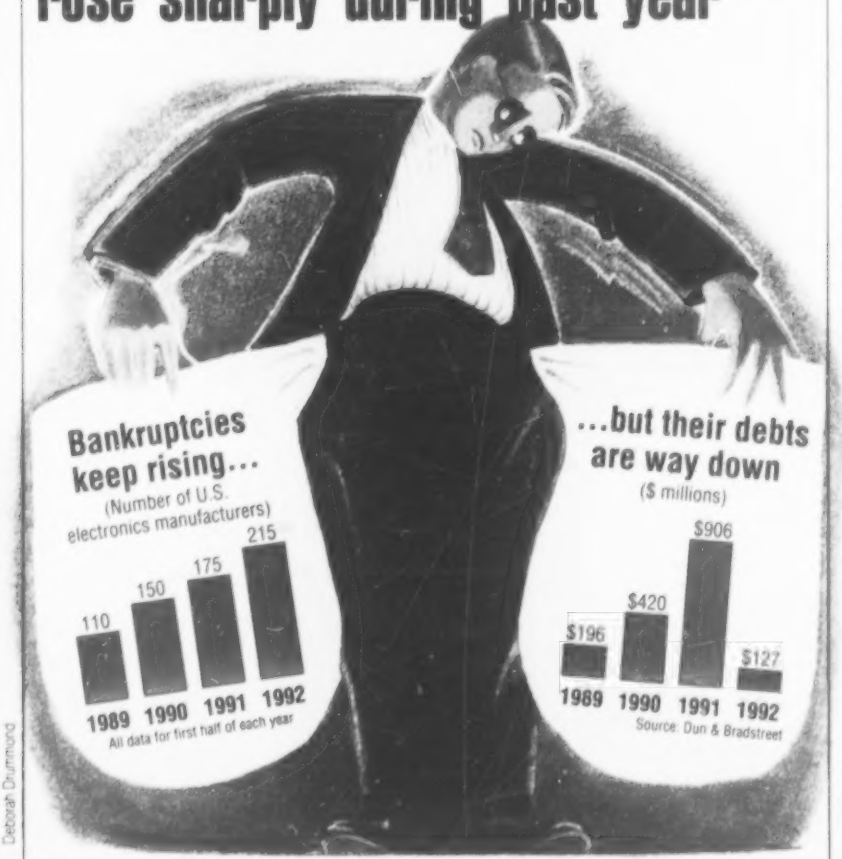
ECONOMICS

Bankruptcies in electronics rose sharply during past year



Deborah Drummond

AS ANOTHER INDICATOR of just how tough this recession has been, Dun & Bradstreet reports that 215 companies went under during the first half of 1992 in electronics and electrical manufacturing alone. That compares with 175 bankruptcies during the same time period last year and 150 two years ago.

The D&B data shows that other industry sectors are also under fire. The computer services and data processing sector registered 351 company closings during the first half of 1992, up from 280 during the same period of 1991. Among instruments manufacturers, 94 succumbed to the erosion in their balance sheets, up from 80 in 1991. U.S. corporate bankruptcies in all industries rose 17% during the first half of 1992.

"Business failures have been rising since April 1990, underscoring the breadth of the recession," says Joseph W. Duncan, corporate economist for D&B in New York. Duncan notes that small service businesses in California and New York have been particularly hard hit. As for the future, "failures will most likely continue to rise during 1992, but by year-end they may flatten out on a year-over-year basis," he says.

If there's any good news in the bankruptcy reports, it's that outstanding liabilities by the bankrupt electronics companies have fallen dramatically: The 175 electronics manufacturers that closed their doors during the first half of 1991 left $906 million of liabilities, versus only $127 million for this year's 215 bankrupt companies. That indicates that more small companies have gone under, whereas larger companies may have begun to stabilize.

The liabilities figures also suggest that many companies that had cut their debt significantly from 1991 to 1992 "still find themselves in trouble," notes Maddy Franchi, senior economist with Cahners Economics in Newton, MA. "For example, Wang Laboratories announced in August that they'd gone into Chapter 11, but their liabilities now are much less than they would have been a year ago."

For the few that eventually come back from bankruptcy, the transition isn't easy. One success: Tie/Communications Inc., a communications equipment company based in Seymour, CT, that this summer reported its first quarterly gain since emerging from Chapter 11 in July 1991. But those profits do not come without painful restructuring and, some say, a serious cost to U.S. manufacturing competitiveness. The company's manufacturing and R&D business was sold to NTK America. Tie/Communications now operates as a sales and service company.

—*E. B. Baatz*

VENTURE CAPITAL

Investors say money is there for good ideas

TIRED OF HEARING entrepreneurs complain that venture capitalists are shunning early-stage financing deals in favor of less risky later-stage deals, the venture community wants to set the record straight. While it's true that less money is being disbursed in seed-and development-stage deals, the number of *successful* venture-funded start-ups today is the same as during the heady mid-to-late 1980s.

The problem, say general partners, is that people equate the excess amount of capital available four to six years ago with a "healthy" venture-capital market. The fact is that too much of the $4 billion in funds created in 1987 went to too many marginally

viable or unsuccessful start-ups.

"For years, I have read all the whining and whimpering about the availability of seed money," says Don Valentine, general partner of Sequoia Capital in Menlo Park, CA. "What people don't realize is that the whiners and whimperers are those who don't have a concept worth funding. There's plenty of seed money available."

Other partners tend to agree with Valentine: You can't compare today's market with those of the past, when disbursement depended more on availability than on good business plans. "There are only so many bright people out there with bright ideas," says Gib Meyers, general partner of the Mayfield Fund. "We pay attention only to the ones we feel can exceilently manage an excellent idea. That's basically what we've always done and will continue to do."

—David Webb in San Jose

COMPUTER MARKETING

Computer sales boom in college bookstores

ATTENTION computer and software vendors: If you're not already on the shelves of college bookstores, you're missing out on your share of a $7 billion market.

Buyers for college stores report that software and computers represent their biggest sales opportunity, according to a survey of 227 college stores by the Douglas Stewart Co. in Madison, WI. Sales of computers, software, printers, and diskettes in those stores are growing. Desktop publishing software sales were up in 37% of the surveyed markets, diskette sales were up in 35%, ink jet printer sales were up in 20%, and Macintosh sales were up in 10%.

It also appears that college buying patterns are recession-resistant. While 36% of the respondents claimed that the recession has had an impact on sales, 60% of college buyers reported either that the recession had no effect or that sales actually increased. Forty-four percent of computer product buyers said the recession had no effect on their sales.

Other research shows that buying patterns established in college are likely to continue, says Douglas Stewart's Scott Bukolt. Both IBM and Apple have independently determined that brand loyalty, as well as system upgrades, continue after college.

How valid are college stores as a sales channel? That depends on location, says Bukolt. Rural campuses have an essentially "captive" market; campus stores in urban areas suffer price competition from mass merchandisers but are getting more competitive in price and selection by changing product mixes and improving inventory management.

An even distribution of college buyers were interviewed from each of the three major groups of college products: general merchandise, computer products, and consumer electronics. About 85% of buyers represent stores in markets with four-year colleges.

—Barbara Jorgensen

Electronics sales in college bookstores

Percentage of college stores that reported rising sales of:

Product	1991 trends
Laser printers	9%
Macintosh computers	10
Database software	13
Computer accessories	19
Ink jet printers	20
Word processing software	26
Spreadsheet software	28
Diskettes	35
Desktop pub. software	37

Source: Douglas Stewart Co.

Joe Farnham

CORPORATE FINANCE

For electronics, banks are more talk than money

MOST BANKS WOULD have you believe that they're earning their way back to health by rolling out the welcome mat to small and midsize companies. According to one expert, however, most electronics companies find loans almost as scarce now as a year or two ago.

"There are facts and there are perceptions," says John Meatte, CEO of First Financial Banc Corp. (FFBC), a Cookeville, TN-based credit structuring company specializing in electronics companies. "The perception banks want us to believe is that they're eager to do business with small and midsize companies. The reality is that when you ask them about loans to high-tech companies, they aren't making any."

According to the FFBC's most recent survey, 61% of the 410 banks polled at the end of May were actively seeking new business, compared with only 18% of those banks in June 1991. That's good news for many profitable, high-visibility, low-risk companies.

But those qualities represent everything electronics companies are not. So while lending in general climbed by 29% this year, loans to the electronics industry rose by just 12%. And while more banks may be willing to talk to electronics companies, the lending criteria for those companies are far tougher than for most other industries. An appliance manufacturer, for example, gets more favorable treatment by banks than an electronics company because the bank could sell off the former's inventory more easily than it could a collection of diodes and circuit boards. Maybe that's why only .06% of the country's banks are lending to high-tech companies.

The ramifications extend far beyond those companies that are unable to convince banks that they are worth the investment. "If companies that have growth potential have trouble getting money, that leaves

them vulnerable to foreign sources of capital," says John Baumeister, vice president of business support services for the American Electronics Association and president of AEA International. "The situation is very critical, and I'm concerned it will get worse."

Don't put all the blame on the banks, though. The companies most in need of money need to realize they're not playing on the same turf as a few years ago. "The electronics industry has a lot of growing up to do," contends FFBC's Meatte. He cites a high-tech company with $150 million in revenue that was borrowing money at 8% from a leasing company. When a bank offered a loan at 4.4%, the company declined because it didn't want to follow the bank's requirements.

"That dogmatic approach is costly and stubborn," Meatte says. "[Electronics companies] don't understand how to help themselves. They just won't face reality. I guess when it gets bad enough so they have no choice, the companies will comply [with banks' requirements] by default, not by design."

—Willie Schatz in Washington, D.C.

INFORMATION SYSTEMS

Transportation a huge market for IS vendors

THE TRANSPORTATION industry's spending on information systems (IS) is ready to skyrocket, according to Natick, MA-based consulting firm Venture Development Corp. Airline, trucking, parcel delivery, railroad, and shipping companies spent a total of $2.9 billion on real-time IS last year and are expected to boost that by 24% in 1992 and another 33% in 1993.

The spending boom is due to a confluence of three temporary factors. First, spending was delayed in the past two years due to the economic slowdown and will be catching up in the next two years. Second, following a gush of spending on satellite communication systems, trucking companies will now be spending more on mobile computing and wireless communication carrier services. Third, the railroad industry is expected to shift from bar-coded automatic identification systems to radio-frequency ID tags.

Not everyone agrees with Venture Development's figures. Based on interviews of IS managers in the transportation-services sector, Business Research Group of Newton, MA, predicts that budgets will increase only 2% this year. That estimate, however, includes only those companies sophisticated enough to already have an IS manager. If low-tech transportation companies plan to compete in this high-tech world, one should expect those budgets will be ballooning—and more IS managers will be hired.

—E. B. Baatz

MARKET DEVELOPMENT

Forum is designed to help forge new business in Japan

FRUSTRATED WITH cultural and political barriers to developing new business and partnerships with Japanese companies in Japan? If so, help may be at hand. U.S. executives are being invited to meet with their Japanese peers in Tokyo December 2-4 to discuss bilateral trade issues, as well as how U.S. companies can develop new business in Japan.

The Alliance Forum (formerly known as Networking Japan) aims to foster mutual understanding between corporate America and corporate Japan without the protocol-ridden atmosphere of government-sponsored meetings. Any company seeking to finance global growth strategies, expand marketing and distribution, or explore partnership opportunities with Japanese companies is encouraged to attend.

"[The meeting] is designed to expedite cooperative ventures between American and Japanese companies," says George Hara, Alliance executive committee chairman. "Several companies [in the past] have successfully completed business negotiations as a result of the conference, and thanks to the support and participation of influential executives on both shores, we are able to improve the state of trade at a grass-roots level."

To sell in Japan requires establishing local distribution, offices, and a business entity. The forum is designed to introduce U.S. executives to Japanese manufacturers, technology providers, consultants, trading companies, and investors.

For more information and registration materials, contact the Alliance Forum at 601 Gateway Blvd., Ste. 425, South San Francisco, CA 94080. Phone: (415) 742-0757.

—David Webb in San Jose

TELECOMMUNICATIONS

Voice processing bucks the economic doldrums

SOME CALLERS just can't overcome their distaste for voice-messaging systems, but you won't hear many complaints from people who have invested in the voice-mail vendors. Many of these suppliers posted record results last year, and 1992's quarterly financials just keep getting better. Overall, the voice-mail market grew to $983 million in 1991, up 22% from the previous year, according to Probe Research Inc. of Cedar Knolls, NJ. Recession? What recession?

Many companies acquire a voice-mail capability as an option packaged with their private-branch exchange (PBX) phone systems, and the leading PBX vendors hold more than one-third of the market (see chart). But independent supplier Octel Communications Corp. of Milpitas, CA, led the pack in 1991 with a 21% market share, according to Harry Schwedock, editor of Probe Research's *Voice Processing* newsletter. For its fiscal year ended June 30, Octel's net revenue hit $188.8 million, up 18% from the previous year. Net income was $21.4 million, a 21% rise from fiscal 1991.

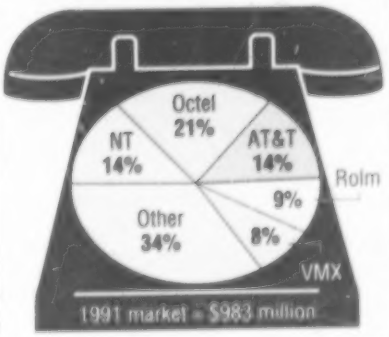
VMX Inc., the second-largest independent supplier, saw its fiscal 1992 (also ended June 30) revenue jump 25%, to $71 million. The San Jose company's fiscal '92 net income totalled $4.7 million, following a net loss of $4.1 million the previous year. At Dallas-based InterVoice Inc., revenue climbed 48%, to $30.2 million, for its fiscal year, ended February 28. Net income, however, fell 19.5% to $2.9 million. And some of the voice vendors failed to participate in the industry's overall growth altogether. Revenue at Phoenix-based Syntellect Inc., for example, dropped 20.2% during 1991, to $28.9 million, and the company experienced a net loss of $2.1 million.

For two to three years, the main trend driving the voice industry has been the consolidation of several voice technologies into single systems. The mainstay voice-mail messaging function still accounted for about 80% of the industry's 1991 sales, estimates Schwedock, but vendors have been adding other capabilities, once sold separately, such as "interactive voice response (IVR)" and "audiotext" to their systems. IVR forges a link between voice systems and information stored in computer databases; audiotext is familiar to people who call numbers provided by newspapers or other sources to hear traffic reports, weather forecasts, or other information.

Octel rose to the top of the voice-processing marketplace by focusing on the *Fortune* 1000 marketplace and meeting the sophisticated demands of these large corporate purchasers. The vendor's top 25 customers each own an average of 88 Octel systems, according to Mike West, an Octel executive VP. The company has also done well selling to the Bell Operating Companies and phone service providers. And, with its recent acquisition of Sarasota, FL-based Compass Technology Inc., Octel now has a system suitable for companies with 100 or fewer employees, according to West.

Octel rings in with top share of world voice-mail market

(Market share by company, 1991)



Source: PRI

Perhaps best of all from Octel's perspective, fewer and fewer callers object to getting a machine on the line rather than a person. "Many people have decided that knowledge from a machine is better than lack of knowledge from an individual," says West.

—Dwight B. Davis

COMPUTERS

Open systems losing their price advantage

THE GOOD NEWS for vendors of open systems is that their share of the U.S. computer and software market will double by 1996. The bad news is that those vendors are losing their price advantage.

U.S. sales of so-called open systems—computer hardware, software, and networking components designed around industry standards—will jump from $23.2 billion in 1991 to $81.2 billion in 1996, according to Frost & Sullivan International, a New York-based research firm. Standards-based products will account for 36% of the total U.S. market by 1996, more than twice their current market share.

But manufacturers of computers based on proprietary architectures have been eroding the price advantage held by vendors of open systems, says Roger Hart, an analyst with the CSC Index research firm in London. Computer makers such as Digital Equipment Corp. have fought back by offering their own lines of open systems and by grafting standards such as Posix (portable operating system interface for Unix) onto their proprietary technology.

"As proprietary systems become more open, they compete with open-system pricing, thereby reducing the cost advantage once enjoyed by open systems," Hart says. "And the traditional vendors keep their market share." Hart warns that vendors of open systems cannot sell themselves on price alone. Product quality and reliability and ease of application generation are the major selling points today, he says.

—Rick Whiting

PROFIT OUTLOOK

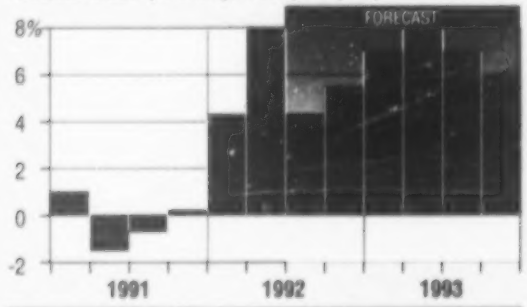
Revenue growth to drive profits forward in 1993

DESPITE THE stop-and-go nature of the economic recovery, electronics industry sales are maintaining steady, although moderate, growth—and that's good news for the 1993 profits outlook. The ELECTRONIC BUSINESS revenue index, representing a cross section of the electronics industry, shows the industry's recovery is progressing right on track. After retreating 0.3% last year—the first decline since 1975—the revenue index expanded 4.3% during the first quarter of 1992 over year-ago levels and jumped 8% again in the second quarter. Look for total industry revenue to rise 5.5% in 1992 and 6.9% in 1993.

The upward trend in revenues is materializing at the just the right time to improve the profits performance of newly reorganized companies. The ELECTRONIC BUSINESS profit index fell over 88% last year as several companies in the index bled red ink. The profit index had risen during the first quarter of 1992 but slipped again below zero during the second quarter due to the substantial losses and massive restructuring charges reported by Digital Equipment Corp. Excluding DEC, the profit index shows industry profits in the second quarter of 1992 climbed 2.9% from the first quarter and surged a whopping 243% from the bleak second quarter in 1991. The profits index overall is expected to climb over 200% in 1993 as revenues grow solidly and restructuring pays its dividends.

—John Farrell

Revenue index (% change from prior year)



(Index: 1975 Q1=100)						FORECAST		
Revenue	540	689	549	601	564	727	587	650
Profits	117	-129	218	-57	150	290	325	335
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
	1991			1992			1993	

Source: ELECTRONIC BUSINESS; Forecast: Cahners Economics

LABOR OUTLOOK

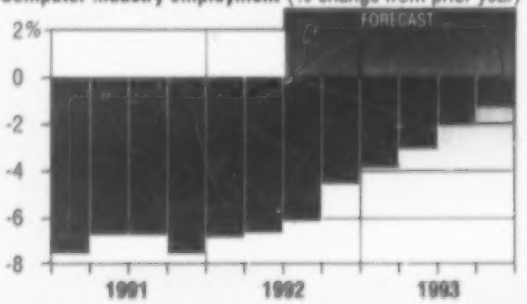
Electronics employment won't improve until late '93

CAHNERS Economics expects employment in the electronics industry to rise slightly from year-ago levels, but not until the end of 1993. In fact, the meager increases will hardly be noticeable. The recession wreaked havoc on employment and the electronics industry fell squarely in the path of the storm. From the end of 1989 to the end of 1991, employment in the U.S. electronics industry shrank by 179,000 workers, or 7.9%. From the beginning of January until July of this year, total nonagricultural employment grew by 446,000 people, but another 52,000 electronics workers lost their jobs.

Employment losses occurred everywhere in electronics manufacturing—computers and office equipment, consumer electronics, communication equipment, electronic components, and instruments factories—but the computer industry suffered the most. Employment in the computer industry has been hemorrhaging since the beginning of 1985. Then, the industry employed almost 340,000 people—1.4 times the number of workers employed today. Just since January 1992, 8,000 people once employed in the computer industry have retired early or are seeking job opportunities elsewhere, and companies continue to announce more layoffs. As of last July, the U.S. computer industry employed only 242,000 people. Watch for average employment declines in the computer industry of 6.1% this year and another 2.5% in 1993.

—Julie Handelman-Sagan

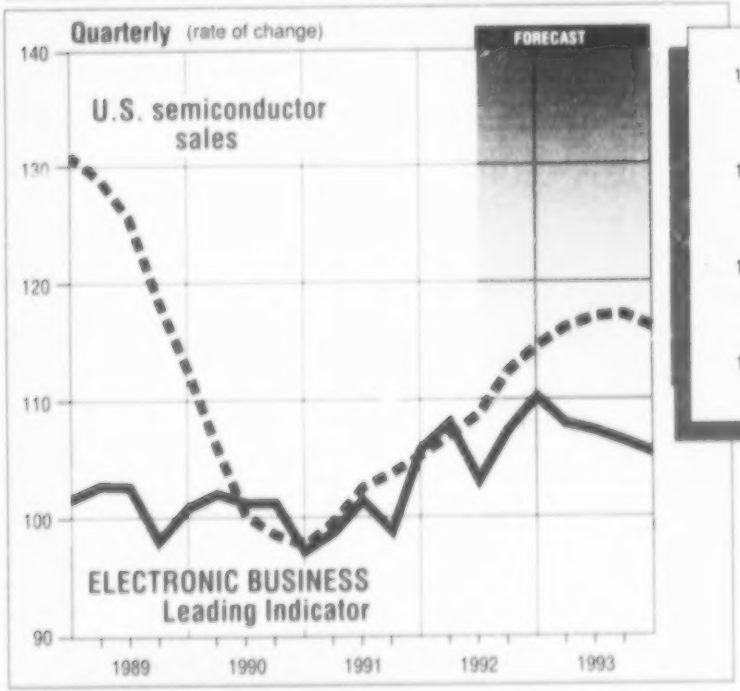
Computer industry employment (% change from prior year)



(thousands employed)						FORECAST	
All electronics	2,292	2,314	2,301	2,225	2,140	2,054	2,045
Computers	303	298	294	279	259	243	237
	'87	'88	'89	'90	'91	'92	'93

Source: Labor Dept.; Forecast: Cahners Economics

ELECTRONIC BUSINESS Leading Indicator

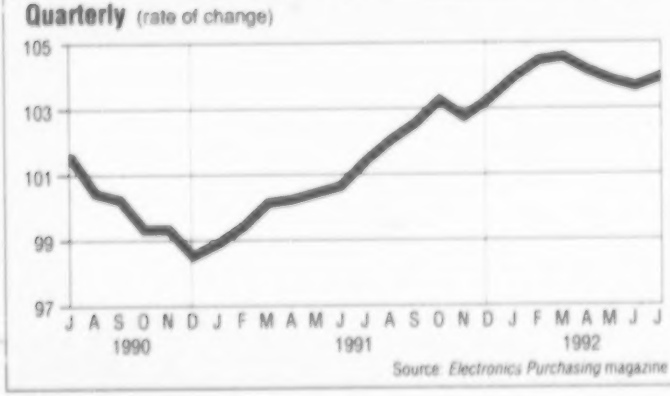


Leading indicator jumps in August

The ELECTRONIC BUSINESS Leading Indicator (EBLI) climbed from 104.6 in July to 107.8 in August. A year ago, EBLI clearly mapped out the double-dip scenario when it hit a low in August 1991 on the heels of a low in December 1990. In contrast, this year's ascent has been based on consistent growth in semiconductor orders—which are forecast to rise 16% in 1992. With average weekly hours worked by semiconductor workers on the rise, EBLI is painting a brighter picture ahead in 1993.

—John Farrell

Hours worked by semi workers slowly lengthen



Source: *Electronics Purchasing magazine*

	Latest month	Previous month	Year ago	1991 average
ELECTRONIC BUSINESS Leading Indicator (rate of change, Aug.)	107.8	104.6	98.6	101.1
U.S. semiconductor bookings ($ millions, 3-month average, Aug.)	$1,612	$1,592	$1,215	$1,311
Weekly hours of semiconductor production workers (monthly average, July)	42.5	42.2	40.2	41.1
Electronic components lead time index (1977 = 100, Sept.)	87.9	92.5	81.4	87.5
S&P's semiconductor stock price index (1970 =10, monthly average, Aug.)	87.3	84.3	72.3	68.5
Change in electronic components inventories ($ millions, SA, July)	-$13	$70	$55	-$57
Contracts and orders for plant and equipment ($ billions, SA, July)	$32.4	$34.5	$39.0	$33.6

SA = seasonally adjusted, all other data are not seasonally adjusted

Sources: Semiconductor Industry Association, Bureau of Labor Statistics, *Electronics Purchasing* magazine, Standard & Poor's, Commerce Dept., Bureau of Economic Analysis, Cahners Economics

EBLI is a weighted composite of six statistics that lead activity in the electronics industry. To obtain a complimentary background paper, contact Michele Cooper, Cahners Economics, 275 Washington St., Newton, MA 02158-1630, USA; telephone (617) 630-2119, fax (617) 630-2100

FORGET THE NITPICKS!

Critics say it's an expensive beauty contest. Advocates say it has improved U.S. industry's quality. Here's the truth

By Peter Burrows

As its fifth year comes to a close, the Malcolm Baldrige National Quality Award remains as controversial as ever. Critics complain that it costs too much to apply for the award, that it can be bought by using high-priced consultants, and that it favors large companies. They further argue that the Baldrige doesn't measure actual financial performance, that it has been awarded to undeserving companies, and that too few companies enter the competition to improve the quality of U.S. industry.

BALDRIGE ANALYSIS

No doubt these criticisms contain some truth, but there are strong counterarguments, too. High-priced consultants certainly helped Xerox Corp. and IBM win Baldrige awards, but they were unable to help Intel Corp. win last year. Moreover, 1991 winners Zytec Corp. and Marlow Industries are hardly giants.

Perhaps most important, while the number of actual Baldrige participants does remain low, U.S. companies have requested more than 50,000 copies of the Baldrige criteria and 10,000 presentations from Baldrige winners, examiners, and administrators.

In the final analysis, the truth is this: The Baldrige program has done more than anything before it to lift U.S. business out of its complacency regarding quality. Industry—especially the electronics industry—has clearly accepted the criteria created by the 250-plus experts on the Baldrige board as a blueprint for improvement.

"We've been following the Baldrige road map for years, so it has become a way of life for us," says Hank Hayes, president of Texas Instruments Inc.'s Defense Systems and Electronics Group, a finalist in this year's contest. "I would suggest strongly that every company pursue the Baldrige criteria. It will improve your whole business."

The Baldrige program has set off a hurricane of interest in Total Quality Management (TQM) that has astounded even its founders. Sitting amidst his frumpy plaque-covered, paper-filled office at the Department of Commerce's National Institute of Standards and Technology (NIST) in Gaithersburg, MD, program director Curt Reimann rattles off evidence of Baldrige's legacy: Baldrige-based quality award programs have sprung up in Minnesota, New York, and North Carolina, with more than 20 more state-level programs in the works; universities, trade associations, and corporations are promoting and implementing the award criteria as the quality improvement system of choice, and seminars, books, and symposia continue to proliferate. There are even off-the-shelf software products to help companies conduct Baldrige self-assessments. "Trying to stay on top of this is like trying to drink from a fire hose," says Reimann, a tireless advocate who gets to work each morning at 4:30 A.M.

Why this maelstrom? Because the Baldrige has put structure behind decades of unfocused corporate energy, says Reimann. While Japanese companies have long adopted the TQM teachings of gurus such as W. Edwards Deming and Joseph M. Juran, Reimann claims "there was no single definition of TQM in the

The Baldrige is working

"I won't be concerned [about the declining number of Baldrige applicants] for at least another year," says Baldrige program director Curt Reimann

U.S. prior to 1987. Now there is. "It did what the quality professionals could not do. It got upper management's attention," says Clark Craig, quality head at Lisle, IL-based Molex Inc. and a former Baldrige examiner.

The impact of the Baldrige is even becoming global. The European Quality Award, an EC-sanctioned prize that will be awarded for the first time this year, is modelled on the Baldrige assessment systems and its overall goals. Reimann has recently helped Mexico and Sweden set up Baldrige-style programs. Swedish authorities say they handed out more copies of the criteria in the first 10 weeks than Reimann's office did in the Baldrige's first year.

"We looked at various supplier awards, ISO 9000, the Deming prize, and many others, but the Baldrige was the best tool for quality improvement," says Johnny Lindstrom, president of the Swedish Institute for Quality.

While an award is just an award, some say the Baldrige is helping to brighten the foreign businessperson's view of U.S. quality in general. "The Baldrige Award is extremely important for America," says Cypress Semiconductor Corp. president T. J. Rodgers, a habitual critic of government programs. "You can make all the criticisms you want, but we now have a prestigious national quality award that is respected around the world."

The big question now is "What's next?" Some observers say the United States is losing its ardor for TQM, and the Baldrige program does find itself at a crossroads. Although the Baldrige has a loyal cadre of followers, only 90 companies applied this year, down from a high of 106 in 1991. Worse, an ELECTRONIC BUSINESS poll this summer shows that only 38% plan to apply in the future, down from 49% last year. Those planning to use it for internal assessment fell to 48%, from 56%.

Reimann, who clearly relishes the opportunity to defend the program, fires off well-rehearsed arguments to defend the Baldrige. "It was never designed for mass appeal but instead as a proving ground for the best of the best . . . A new network [of companies interested in TQM] is more significant than a new applicant . . . We couldn't process all the applications if it got much bigger."

Reimann also says that the temporary obsession with ISO 9000 has depleted applications this year as companies rush to become certified to that emerging standard by the December 31 unification of the European Common market [see sidebar]. Most agree that ISO 9000 is a less demanding quality improvement tool than the Baldrige.

"The Baldrige means less and less around here all the time," says Dick Rosen, president and COO of AVX Corp. in Myrtle Beach, SC. "It would be a neat thing to hang on the wall, but not if it costs more than the wall to get." An even more typical view is that of Brooktree Corp. CEO James Bixby. "We see a lot of benefit in the Baldrige, but we're not particularly motivated to apply right now," he says. "The time and energy required would take time away from more direct business issues."

Even past winners are de-emphasizing the

The Baldrige and ISO 9000: it's not either/or

ONE OF THE KEY debates in quality management today is on the merits of the Malcolm Baldrige National Award criteria versus the International Standards Organization's (ISO) 9000 series. Which is the better quality improvement tool?

Recent data suggest that companies are flocking to ISO 9000 and not to the Baldrige. According to a recent ELECTRONIC BUSINESS poll, the percentage of companies that applied for ISO 9000 certification rose from 9.2% in 1991 to 23% in 1992, while the number that applied for the Baldrige fell from 5% to 2%. The number of companies that had plans to go for ISO 9000 in the future fell from 53% to 46% in that time, while the number of companies with plans to go for the Baldrige fell from 49% to 38%.

Unfortunately for ISO 9000 crusaders, the debate between the Baldrige and ISO 9000 is an artificial one. In truth, the rise of ISO 9000 is driven not by commitment to Total Quality Management (TQM), but by companies' desire to earn or maintain business from the growing number of government agencies and companies that demand ISO certification.

"ISO 9000 is required or strongly suggested by more customers all the time, and it is rapidly moving to smaller suppliers," says Mark Morrow, editor of *Quality Systems Update*, a Fairfax, VA, newsletter that tracks ISO 9000.

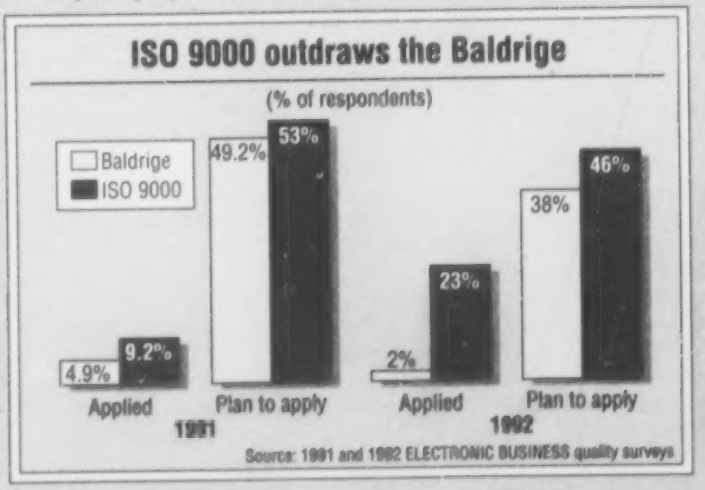
For companies who have held up their ISO 9000 certificates as proof of quality-consciousness, this marketing windfall will soon disappear. While only 38 U.S. companies have received certification as of yet, Morrow says that "hundreds are now on the threshold." He expects the number of certified U.S.-owned plants to quadruple in the next year.

More importantly, ISO 9000's honeymoon as the next great key to quality is coming to an end. While it is a fine starting point for companies, ISO 9000 still represents a low level of TQM.

The standards [there are three, each covering slightly different subsets of the product development cycle] only require companies to prove they have basic quality systems in place to ensure their ability to deliver quality products. They don't require companies to prove the *actual* quality of their products, and they don't require that quality systems be deployed throughout the corporation, as the Baldrige criteria do.

"There is definitely a misconception that relates ISO registration with quality excellence, and I don't think there is a direct correlation," says Hank Hayes, president of Texas Instrument Inc.'s defense systems and electronics group in Dallas. A perennial Baldrige applicant and a finalist this year, he notes that his group has had to comply with the Defense Department's ISO 9000-like 9585 standard since 1962, "yet we still found a tremendous overall improvement in quality when we moved to the Baldrige."

"ISO 9000 has taken on such a euphoria and is attractive because you get an actual piece



Baldrige as they proceed with their quality efforts. Of the four winners from the electronics industry that ELECTRONIC BUSINESS surveyed, only Motorola Inc. will actually do an internal assessment of its operations using the Baldrige criteria this year. [Motorola has trained 92 in-house examiners, using the same training regimen as the Baldrige program.]

Also, many companies have backed away from pledges to require their suppliers to apply for the award, as both Motorola and certain units of IBM have done.

Convex Computer Inc. of Richardson, TX, had plans to require its suppliers to apply for the Baldrige, even though Convex itself had never applied. "When we really sat down and thought about it, we realized that we wouldn't want to be told to apply until we thought we could win," says COO Terry Rock.

There is no doubt that customer strong-arming has been a key driver of the Baldrige's popularity—and an effective vehicle to force suppliers to join the race for higher quality. Of the 399 companies that have applied for the Baldrige since the program began in 1988, 238 of them—that's 60%—are Motorola suppliers, the company estimates.

While many say that the Baldrige has become too clubbish to attract the industry at large, there is no danger of it disappearing soon. A feel-good symbol of a resurgent America, the Baldrige enjoys broad political support from both parties and continued support from corporate powers including Motorola, IBM, Xerox, and Mobil; 1992 finalists AT&T and Texas Instruments; and a few dozen more.

There are steps the Baldrige committee can take to make the award more appealing. Better scheduling is one. Currently, applications become available in February but must be submitted by April 1. Many applicants say they need more time to respond to yearly changes in the criteria. "Going for the Baldrige may be great for the company, but it makes it real tough for the poor S.O.B who has to write down all the answers," says one project leader who worked for eight straight weeks to complete the 98-question application.

Applicants have also complained that they received too little feedback too late, usually in December, which is just months before the April submission deadline. That's now changing. This year, reports were being delivered to some companies as early as late August. Feedback reports are now also longer—typically 20 to 35 pages long.

Peter Pappanastos, VP of quality for 1992 applicant Pyramid Computer Corp. in San Jose, suggests that each applicant—not just finalists—receive a site visit from examiners along with detailed scoring data for each of the criteria's seven sections, rather than one aggregate score.

"If this is truly a tool for U.S. companies to improve, then they should take the time to meet with each company and tell them more

of paper if you pass," notes Motorola Inc. director of quality Richard Buetow, "but it may not ensure satisfactory suppliers."

That's not to say ISO 9000 is not worth doing. In fact, it is worth doing for the best of reasons—to maintain and attract new customers, especially overseas. "The Baldrige did a great job of raising awareness, but ISO 9000 is much more valuable in practical terms," says John Mann, vice president of quality for AVX Corp. in Myrtle Beach, SC. "Last week we had four customers who wanted to know about ISO 9000. We haven't had someone ask about the Baldrige in the last six months."

While most companies realize cost savings from lessons learned in the process of complying with ISO 9000, the cost of getting certified isn't cheap. Companies must pay to bring in a third-party auditor to do the certification assessment as well as follow-on maintenance assessments, which vary depending on the assessor; some do checks every six months, while others only come back once every two years.

Costs can vary widely, however, depending on the company and the assessor. Motorola, which has had 18 facilities certified [15 in Europe], says it spends about $40,000 per site, not including the $150,000 that will be spent over time on maintenance assessments."We do it because we don't know if our customers will require it, but we're not very happy about it," says Buetow. Du Pont Electronics, on the other hand, says it spends about $14,000 for the initial audit and $2,400 for surveillance visits. The company has earned certificates for 22 of its 35 facilities worldwide.

While expensive, many executives had hoped their investment would lead to fewer audits of their facilities by customers. "The idea of third-party certification sounds great, but not everyone signs up for it," says Clark Craig, director of quality for connector supplier Molex Inc. in Lisle, IL. "We still want to see what our suppliers are doing, even if they are ISO 9000 certified. I expect other companies feel the same." □

directly how they can improve," Pappanastos says.

Marty McCoy, quality director for Boulder, CO-based Exabyte Corp., another 1992 applicant, agrees. "The only way they really understand is when they come for a site visit. Until then, all you've done is a term paper."

Possibly the greatest threat to the Baldrige, therefore, is that it will change *too* fast. For example, when the Baldrige committee was preparing to change the 1992 criteria to give greater weight to bottom-line financial performance—something it ultimately did—Motorola quality director Richard Buetow unsuccessfully argued with Reimann for four hours not to do it.

"I think they're moving too fast; I'm afraid they are just answering the critics," says Buetow. "The Baldrige examiners are simply not competent to analyze all the different market segments they see or to calculate the proper rates-of-return for each," he says.

Indeed, pressure to extend the Baldrige criteria into non-traditional quality areas seems likely to increase. Many fear this could discourage participation in the program and dilute the value of the criteria as a quality improvement tool. New York State's Excelsior Award, for example, is administered by the N.Y. Department of Labor and includes a section dealing with labor-management issues.

Reimann says that the Baldrige committee is sufficiently buffered from political forces that might try to impose new values on the program.

Let's hope it's sufficiently protected. The Baldrige criteria "[is] neither so narrow that it is uninspiring, nor so broad as to be unmanageable," Harvard University Business School professor David Garvin pointed out in a *Harvard Business Review* article last year. The Baldrige has obviously struck a nerve in the boardrooms of America. Trying to do too much with it could chase would-be applicants away.

In the final analysis, the best benchmark of the Baldrige's effectiveness is the record of past winners:

- Despite the dismal condition of its market, IBM's minicomputer division in Rochester, MN, (1990) has prospered by doubling the number of new customers and improving market share by 18%;
- San Jose-based contract manufacturer Solectron Corp. (1991) continues to grow by leaps and bounds. After three quarters, it exceeded 1991 sales by 9%;
- Even General Motor's Cadillac division (1990), a much maligned choice when announced, has muted many critics; sales of its redesigned Seville jumped from 150 to 600 in Japan last year and earned accolades as one of Japan's top five imports of the year.

There have been some riches-to-rags stories. For example, oil field equipment distributor Wallace Corp. (1990), which declared bankruptcy this January, seems to have been more the victim of the protracted slump in the oil business and the ill-timed failure of its bank rather than from than from the widely reported explanation that management was too busy making Baldrige-related presentations to deal with its problems.

"We believed in the Baldrige then and we believe in it now," asserts Wallace CEO Robert Vaughn, a former consultant who was assigned to the top spot by the majority-owning Wallace family earlier this year. "This company has had problems for 10 years, and we'd have been in reorganization long ago if it hadn't been for our TQM efforts." □

Scores shrink as Baldrige judges get tougher

(1,000-point scale)

	1988	1989	1990	1991
Average score	610	663	486	408
Number of applicants	66	40	97	106
Number of winners	3	2	4	3

Source: American Society of Quality Control

Average scores have dropped considerably since the Baldrige program began in 1987. Not only have examiners learned more about how to analyze companies, but the criteria has been tweaked to focus more on the results of quality efforts rather than on organizational issues

Benefits of the Baldrige at IBM

(Medal-winning divisions versus IBM at large)

Customer satisfaction	6% higher
Employment morale	3% higher
Market share	7.4% higher
Revenue	Grew
Profits	Grew

Source: IBM

All major business organizations at IBM must do annual self-assessments using the Baldrige criteria, and management hands out bronze, silver, gold, and chairman's awards to those that score within predetermined ranges. Do these exercises translate to business succes at Big Blue? In a study that began in early 1991, the 18 medal-winning organizations have outperformed the corporation by most key measures

TQM reality check: It works, but it's not cheap or easy

Despite noisy criticism and difficult-to-measure results, most companies agree that quality improvements pay off

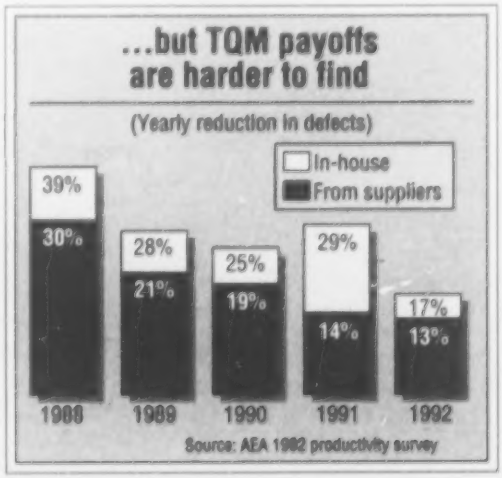
By Peter Burrows

QUALITY REALITY CHECK

It's been more than a decade since Hewlett-Packard started the Total Quality Management (TQM) revolution by slamming U.S. chip makers for poor product quality relative to their Japanese competitors. The shock wave caused companies throughout the electronics industry to finally consider the long-spurned teachings of Deming, Juran, Taguchi, and others that had made the Japanese so successful.

Ten years later, U.S. companies are still at it. From large computer makers in need of resuscitation to start-up companies who must prove their quality from the outset, TQM continues to gain steam as a way of doing business. "There's definitely a falling out occurring in this industry," says John Osborne, vice president of quality for semiconductor equipment maker LAM Research Corp. in Fremont, CA. "Certain companies are continuing to grow and gain share, and they are the ones that continue to invest in TQM. The others lose out as new priorities come up."

On balance, these TQM efforts seem to be paying off. No company contacted for this report had scrapped its TQM program, and 91% of 70 companies polled in an ELECTRONIC BUSINESS survey this summer said their quality has improved versus their competitors; 73% say their industry segment has improved versus the foreign competition. Even consumers have noticed the change. A survey done for the American Society of Quality Control by the Gallup Organization shows that 63% of consumers think that U.S. products



are better able to compete than five years ago.

That's not to say that America's quality revolution doesn't have critics. Indeed, many observers argue that U.S. industry's love affair with quality is fading. They cite the low number of applications for the Malcolm Baldrige National Quality Award, which fell to just 90 from 106 in 1991, and the reduced interest in quality-related events reported by the prestigious Conference Board and other business organizations. Moreover, a survey from the American Electronics Association shows that the percentage of U.S. companies with TQM programs in place has fallen from 86% to 75% since 1988—and that the rate of defect reduction per year has fallen from 39% to just 17% in that time.

Christine Mona

"Probably 95% of [TQM] programs fail, but no one has the guts to say so," charges industry veteran Luigi D'Angola, now a professional fellow at Dartmouth College

"There has been a tremendous amount of lip service, but the results have frankly been pathetic," says Jack Moore, a senior partner with and author of the survey for the consultancy Pittiglio Rabin Todd & McGrath (PRTM). Outside of the 9% that have reduced defects by 50% or more, most electronics companies normally only improve by about 5% to 10% per year, he says. "At that rate of improvement, most companies are *losing* ground to the market leaders."

Perhaps most damning, critics claim TQM has done little to boost U.S. competitiveness. Productivity growth of the U.S. manufacturing sector grew only 3.1% between 1985 and 1990, compared with 4.2% for the United Kingdom, and 4.3% for Japan, according to the Annual Index of Manufacturing Production from the U.S. Bureau of Labor Statistics.

"TQM is failing in an incredible way," charges Luigi D'Angola, an industry veteran who now teaches at Dartmouth College as a professional fellow. "Probably 95% of the programs fail, but no one has the guts to say so. It's too politically correct."

Maybe, but maybe not. Advocates of TQM, including ever-optimistic Baldrige program director Curt Reimann, say the criticisms completely miss the point. "Japan started its quality thrust around 1950, and it took them until the 1970s to be recognized as a quality leader," says Reimann. "Many of our companies have caught up in less than 10 years, so you have to keep things in perspective."

Indeed, it seems clear that the early revivalist-tent-meeting brand of TQM has matured into a more sophisticated and practical approach to business that is paying dividends. High-ranking executives have taken the reins from sloganeering consultants. Rather than naively dumping money into TQM training programs, companies are focusing on cost containment and ways to improve the efficiency of their quality programs. The academic focus of early efforts, as characterized by the fervent belief in the teachings of one particular guru, has given way to a focus on customer needs.

"There's always a lot of thrashing and churning when you get into TQM," says Cypress Semiconductor president T. J. Rodgers, who launched Cypress's program in 1985 in response to mounting customer complaints. "Now it's really starting to pay off."

According to the ELECTRONIC BUSINESS survey, U.S. commitment to quality is growing, not shrinking:

- Executives said they've planned to increase spending on quality-related training from 2.1% of revenues in 1991 to 3.9% this year;
- The percentage of companies who give quality training to upper management will rise from 66% in 1991 to 90% in 1992, and the number that give training to the top executive will rise from 56% to 83%;
- The percentage of companies using quality improvement measurement tools will rise from 40% to 76%.

Other indications of the rising commitment to quality are the regional TQM cooperatives that are springing up around the nation. In New England, for example, 33 companies now belong to the Center for Quality Management.

Companies with over 500 employees pay $10,000 per year ($5,000 for under 500 employees) to network and to access training courses and seminars. In the Northwest, five companies have forged the first of a series of Partnerships for Competitiveness set up by the AEA in which each company pays about $42,000 per year. The AEA plans to launch a partnership every six months or so.

"I've seen a lot of fads come and go, and I've not been a fan of most," says James Bixby, CEO of mixed-signal IC maker Brooktree Corp. in San Diego. "TQM simply makes good sense. It involves things that everyone in the

Motorola's quality crusade remains a model for the industry

MOTOROLA INC. may be electronic's best leading indicator of the TQM movement. Lambasted for poor quality in the early 1980s, the Schaumburg, IL-based company dove into TQM with a religious fervor never before seen in the U.S. electronics industry. A decade later, they're still at it. A 1988 winner of the prestigious Malcolm Baldrige National Quality Award, there seems little the company will not do in the name of quality:

- In 1988, it launched its now-famous Six Sigma campaign to reduce defect levels in all parts of the company to less than 3.4 per million opportunities;
- It spends lavishly to provide every employee with at least 40 hours of quality training per year. In 1991, Motorola spent 3.2% of total payroll in this effort;
- It has spent $70 million to create and run Motorola University, a TQM training organization with facilities on three continents;
- Executives have given over 1,700 speeches and presentations on TQM;
- The company has spent hundreds of thousands of dollars to create the Six Sigma Research Center, which it runs with Kodak, Texas Instruments, IBM, and Digital Equipment;
- Motorola runs an annual employee recognition contest of epic proportions. Last year, 30,000 Motorolans took part in the contest, which culminated with a week of presentations, dinners, and parties in Chicago for the 22 teams that made the finals.

TQM has cut Motorola's costs by $2.7 billion since '88, says VP Richard Buetow

When the Baldrige criteria began to take root as an effective framework for quality improvement in the late 1980s, the company worked to integrate it with its existing quality system. Motorola required week-long audits of all operations every two years. Now the company is integrating ISO 9000 into its already hybrid system.

"We're developing processes and procedures that meet the requirements of all three," says Jack Haslup, director of quality assurance and customer satisfaction for the computer group. When finished, the quality system—all 35 pages or so of it—will be put on-line so all employees can easily determine the accepted way to complete a given task. "Now that we have a single quality system, we're finding that there isn't a lot of unnecessary structure to bog down our TQM programs," says Haslup.

Has all this effort paid off? Motorola certainly thinks so. "The payback is so high that we usually don't bother to calculate it," says executive vice president and quality director Richard Buetow.

Buetow claims the $11 billion company has reduced costs by $2.7 billion since 1988, including $700 million in manufacturing costs alone. In the process, employee productivity has improved by 78%, even as the company grew 94%. Best of all, customers and competitors alike report that Motorola has closed the quality gap with Japanese rivals. Says Cypress Semiconductor president T. J. Rodgers, "Moto's quality has progressed to the point where most people can't tell the difference [from Japanese rivals]."

Buetow is especially proud of the 8.3% increase in headcount that has occurred in that time. "We sell computers and automotive electronics and defense systems—all industries that have had their share of lay-offs of late," he points out. "Not only did we save the 102,000 jobs we started with, but we've added 16,000 more." □

company can use if you just make it available to them." Once a shoot-from-the-hip technology company, Brooktree executives now take part in weekly quality meetings, and Bixby claims that all employees are members of quality-improvement teams. One result is a reduction in cycle time from 40 days to about four, Bixby says.

While he can't prove it, Bixby credits the TQM program for raising profits 40% through the first half of this year, compared with 11% revenue growth.

The question remains, however, as to why more U.S. companies are not doing better with TQM. The four-year slide in defect reduction rates in the AEA study, which has tracked over 400 companies for 5 years, is certainly discouraging. "We're at a loss to explain it," says PRTM's Moore. "The industry seems to be getting smarter about TQM, but the surveys simply don't show it."

Critics claim TQM has done little to boost U.S. competitiveness

One possibility is that the industry at large is just getting to the point of bottom-line benefit with its TQM efforts. After years of work to put quality systems in place, many companies are for the first time focusing on results rather than on training employees and benchmarking competitors. They are progressing to the next phase in which TQM is used to directly tackle customer complaints—and thereby win market share.

Take the example of Varian Associates Inc., the Palo Alto-based IC production equipment maker. The company had realized impressive operational quality improvements at many of its units but got no identifiable bottom-line

Making TQM work in times of trouble

ONE OF THE CORE tenets of Total Quality Management (TQM) is employee involvement and teamwork—but how can the necessary trust and morale be maintained at companies in the throes of downsizing?

Take AIL Systems Corp. of Deer Park, NY. In 1984, the company had grown to $800 million per year with 6,000 employees on the strength of Air Force contracts to build defensive systems for the B-1 bomber. Since then, defense cuts prompted relentless downsizing, to $272 million and 1,600 employees.

Surprisingly, the corporate trauma has not deep-sixed the TQM effort launched by management in 1989. In fact, it seems to have done just the opposite. "We know we have to do things better, or we simply won't survive," says Tom O'Brien, who now works with seven others in a stockroom that used to be crowded with 40 workers. "That's the era we're in, and we have to live with it." Sprinkling his speech with TQM-speak, O'Brien talks enthusiastically of training courses and of his participation in a cross-functional team to cut procurement times.

This phenomenon seems to be common in the electronics industry. Even as large computer makers such as IBM and Unisys struggle to make massive strategic shifts, they report impressive operational improvements and stable employee morale levels. "Had it not been for the quality practices we had in place, we would have had a much tougher time maintaining morale," says George Ballata, a longtime manager at Minneapolis-based Control Data Corp., who has himself taken an early retirement package after the company scrapped its hardware business earlier this year.

Management must carefully direct the introduction and maintenance of TQM programs, however. Many employees at AIL, for example, saw TQM as a threat to their jobs when it was first introduced, and controversies still flare over expenditures for off-site quality meetings and the $100,000-plus that was spent to apply for a New York State quality award last year.

Quality assurance director Charlie Decker says that frankness, empowerment, and recognition are the best means to get employee buy-in. The company has implemented an employee suggestion program and has put 437 of the 467 suggestions made so far into action. Expected lay-offs are announced well in advance whenever possible. "Employees cannot tolerate uncertainty," says consultant and industry veteran George Ebel. "TQM can do well when times are bad if you have enlightened management, but it cannot survive a constant onslaught of change." His advice: Make lay-offs deep enough to last. □

benefit. One unit improved on-time delivery from 42% to 92% and reduced warranty costs from 15% to 6%, but it saw market share shrink. A components division cut scrap by 400% but profits dropped. A systems business reduced cycle time dramatically but watched inventory increase.

To some extent, the mystery has since been explained, says executive vice president Richard M. Levy. Since incoming CEO Tracy O'Rourke refocused the TQM effort on customer complaints when he joined Varian in February 1990, he found that poor voice-mail habits, slow service, and hard-to-use software were limiting sales growth, regardless of improved product quality, on-time delivery, and cycle time.

"I've seen a lot of fads come and go, but TQM simply makes good sense," says Brooktree CEO James Bixby

"Blind adherence to a given process can easily cause a manager to overlook the changing priorities of customers," says Levy. "Customizing the process can, and has, resulted in a vital business system that energizes employees and contributes to success."

Other companies have survived similar missteps and are now seeing the signs of a mature quality-based corporate culture taking root. "When you first get in to TQM, the religion tends to take over for common sense, and employees sense that in a nanosecond," says Cypress's T. J. Rodgers.

Rather than a pasture for long-in-the-tooth lifers, the quality director's office is being filled more and more with up-and-comers

The improving status of the much maligned title of quality director is also an indication that quality is being taken more seriously. Rather than a pasture for long-in-the-tooth lifers, the quality director's office is being filled more and more with up-and-comers. When IBM chairman John Akers gave a top quality post to Lawrence Osterwise, who managed Big Blue's minicomputer operation in Rochester, MN, to a Baldrige in 1990, "it was a clear statement that commitment to quality is a way to get ahead," says one IBMer.

Similarly, Cypress's Rodgers chose former top product line manager Jeff Kaszubinski to be his vice president of quality and reliability assurance. "He was right where he wanted to be as head of the EPROM group, but I asked him to step down," says Rodgers. "He could contribute more to the company from the quality office, and I made it worth his while to do so."

Rodgers goes so far as to hint that the top quality job is a likely jumping-off spot for the presidency of the company. "I don't see how anyone could succeed me who hadn't been the vice president of quality or manager of a major business that demonstrated quality leadership that others were trying to emulate," he claims.

Yet another sign of the maturing of TQM is the increasing focus on the cost side of the equation. From the days when early adopters threw money at TQM on the strength of consultant Philip Crosby's "Quality is Free" mantra, companies now recognize—and look to closely manage—their TQM-related dollars. "Companies used to pay some education firm millions of dollars and then tell their employees to 'go forth and make quality,'" says PRTM's Moore. "The result was a lot of small 5%-to-10% improvements, but nothing major."

That attitude is starting to be rethought by quality leaders. IBM, for example, is working to reduce the percentage of payroll spent on training—a level that reached as high as 5% at the Baldrige-winning unit in Rochester, MN.

"We have a huge college catalog of courses, but that wasn't giving our people a consistent set of information on a core of topics in a reasonable amount of time," says Osterwise. "We would have managers taking leadership courses with 25 other people and getting all charged up, only to find that no one knew what they were talking about when they got back to the office."

To make sure the course work takes hold, the Rochester unit now converts its cafeteria into a classroom for a day-and-a-half each year during which time every employee gets a 90-minute basic-training session, starting with managers at 7:00 A.M. on the first day. "It may not sound it, but this saves us money in the long run." □

What is return on quality, and why you should care

Cost of quality calculations often show huge payoffs, but "return on quality," or ROQ, may be a concept ahead of its time

By E. B. Baatz

Quality improvements can pay off big, but proving it and monitoring it in ways that will satisfy numbers-driven CEOs and their Wall Street backers is another challenge altogether. For starters, there is considerable confusion about what return on quality, or ROQ, actually is.

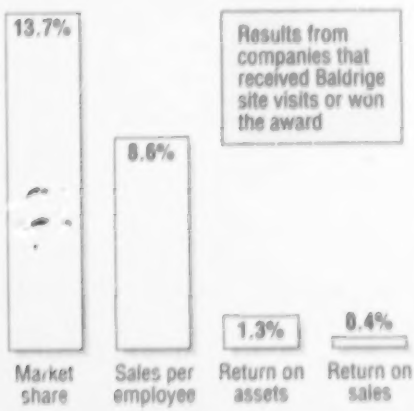
RETURN ON QUALITY

Tracking down the immediate payoff from reducing defects, waste, and customer returns is a fairly straightforward process. Eliminating these costs—typically called the "costs of poor quality"—gives a fast boost to the bottom line, and it's a number that's easy to calculate. Yet return on quality—the price premium that a company gets on its product for its investment in quality—is a much more comprehensive concept. Many executives complain, and rightfully so, that it is a hard number to pin down.

Critics suggest that those executives who worry most about profitability are the ones stalled in their total quality management (TQM) program. It's helpful, though, to draw the distinction between those companies in the initial

Baldrige hopefuls report mixed bottom-line results...

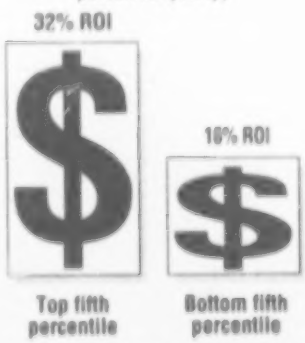
(Average annual percentage increase)



Source: Government Accounting Office, May 1991

...and ROI tracks customer perception of quality...

(Return on investment correlated with perceived quality)



Companies ranked in the top fifth percentile on quality by their customers had higher ROIs than those in the bottom fifth.

Source: Strategic Planning Institute, Cambridge, MA

stages of reaping cost-of-quality benefits, when the savings are big and everyone is euphoric, and companies in the later stages of continuous improvement, when quality has become a strategic advantage. For those in the latter stage, the quality-to-profits ratio is still a black hole.

IT'S SIMPLE to rationalize spending on quality in the beginning. Chances are, many electronics execs who have recently turned their skills to quality management have shared the experience of Matt Bergeron, chief financial officer for board maker Praegitzer Industries Inc. in Dallas, OR. One day, CEO Bob Praegitzer came into Bergeron's office and asked him to justify the company's quality investments.

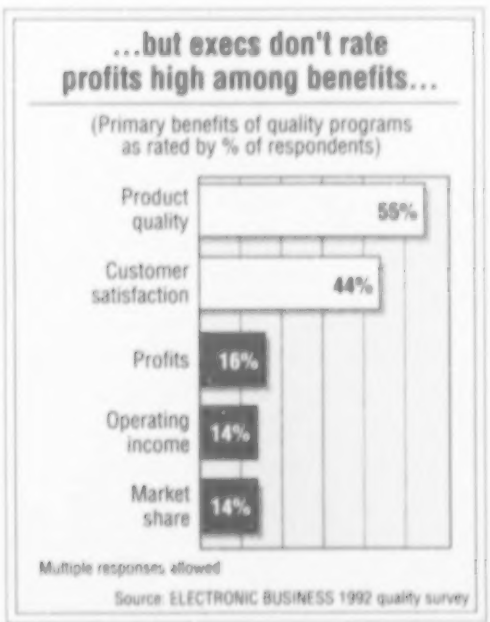
"We spend one hell of a lot of money on quality, and that's why he asked the question," says Bergeron. He examined the inverse relationship between gross profits and money spent on quality. Bergeron's conclusion: There was a clear, definite payback. He found, for example, a six-times return from the company's spending on training.

Pioneers on the subject such as H. James Harrington, author and quality adviser for Ernst & Young in San Jose, have long ago concluded the returns from reducing the costs associated with poor quality can be substantial. Harrington estimates the cost of poor quality exceeds 10% of sales for electronics companies; for manufacturing companies in general, he calculates those costs average between 20% to 30% of sales; and for service organizations, the costs run a staggering 30% to 50% on average. When these costs are eliminated, the return can be dramatic. "It's very common that a company can save more money by cutting poor-quality costs in half than it can make by doubling sales," says Harrington.

What's surprising, though, is how few companies actually keep track of the cost of quality. In May 1991, the Government Accounting Office (GAO) released a study of 22 companies that had made it into the final round of the Malcolm Baldrige National Quality Award competition. The GAO found only five companies had measured the cost of quality. Another study done in 1989 by the American Electronics Association in conjunction with the Weston, MA, consulting firm of Pittiglio Rabin Todd & McGrath showed only 40% of those surveyed had calculated their cost of quality.

Why don't more companies do the math? The companies studied by the GAO cited the problems inherent in defining the sometimes subjective cost factors and the administrative burden of collecting the data. Furthermore, when the returns to the bottom line are so big and so dramatic, some figure, why bother to stop and calculate it? "These are no-brainers," says Richard M. Levy, executive vice president of Varian Associates Inc. in Palo Alto, CA. "If you're doing it right, you're getting payoffs every day."

YET, IT IS possible to spend too much on quality programs. "You make a big mistake if the improvement process doesn't pay back in the first year. There are over 150



Cindy Charles

"**I think you** can invest too much in quality. There are always marginal dollars to look at"

Matt Bergeron
CFO, Praegitzer Industries Inc.

different improvement tools now, and CEOs need to look at which ones will deliver the biggest profits," says Ernst & Young's Harrington. "I think you can invest too much in quality. There are always marginal dollars to look at," agrees finance officer Bergeron. Spending more money to reduce defects, says Bergeron, may not give you an adequate payback because if you're already a leader in your product area, no customer is going to pay you extra for the money spent on quality. This, of course, begs the questions: How much is too much? And to determine that, should companies be figuring out how to measure ROQ?

Particularly for companies in the latter continuous improvement stage of a quality program, the answers to those questions aren't easy because ROQ is more than simply calculating the cost of quality. ROQ should also measure the returns that come from investing in quality over time—not just from reducing defects. "The evidence is clear on company case studies of cost savings," says Bradley T. Gale of Boston-based consulting company Market Driven Quality Inc. "In terms of whether increased quality means [being able to obtain] price premiums, the evidence is still not in."

Indeed, high-tech executives and quality consultants who have grappled with the need to calculate ROQ fall among a spectrum in an emerging debate about it. At one end are those who take it on faith that quality works. These executives waste little in worry or effort trying to measure quality's benefits.

At the other end of the spectrum are those still looking for effective measurement techniques beyond cost of quality. They continue to plow more and more money into TQM programs while they search for better formulas to prove TQM's worth.

At Motorola, quality comes first and profits are just expected to follow. "I have a problem with anyone who asks for a cost/benefit analysis," says Jack Haslup, director of quality assurance and customer satisfaction for Motorola's computer group in Tempe, AZ. "We don't allow defects to be characterized as minor or major. They all must be eliminated [because] we simply can't afford to have poor quality."

Listen to Jim Oehrlein, manager of Motorola's corporate financial reporting group in

Tim Jarvis

"**I have a problem** with anyone who asks for a cost/benefit analysis"

Jack Haslup
Director of quality assurance
Motorola Inc.'s computer group

Schaumburg, Ill., describe his department's quality drive. "It was more important in our case to identify cycle time and process improvements. Direct cost savings were a secondary consideration." That the group saved $223,000 in its first year as a result of streamlining the quarterly financial reporting process was not Oehrlein's primary goal.

The debate surrounding ROQ isn't black and white. "I think [ROQ] is a good question, but in some ways, it falls into what [quality expert] Dr. Deming calls the unknown and unknowable," says Tom Ashburn, general manager of the worldwide support materials operation for Hewlett-Packard Co. in Roseville, CA. Still, Ashburn warns, "you can spend money on things that relate to quality for which there is no payback. So while you can't get your arms around all the financial aspects of quality, you have to be constantly testing to make sure the spending makes sense."

Ashburn's group has been implementing TQM for 10 years, and he recalls spending too much time and money in the early days. He says he trained people too soon and didn't give his team a solid business framework in which to implement process improvements. Now he requires a rigorous application of something he calls "business fundamental tables" where profits, customer satisfaction indexes, and inventory levels are closely monitored every month.

Likewise, at IBM's Rochester, MN, plant, the trick now has been to integrate a concept which Roy Bauer, director of quality, calls the "quality payback formula." As well as the tan-

Customer-supplier quality program nets $4.8 million

THE TRICKLE-DOWN economic theory may be out of favor these days, but trickle down in the quality arena still has a lot of punch left. Take the case of a customer-supplier partnership between two Silicon Valley companies, local area network supplier SynOptics Communications Inc. and printed circuit board (PCB) maker Sigma Circuits Inc. Partly as a result of their *interdependent* quality programs, the two have delivered some impressive numbers—their joint savings totaled $4.8 million last year, about 1.7% of their combined annual revenues.

Eighteen-year-old Sigma Circuits, a privately owned company with about $30 million to $40 million in annual revenue, began its total quality management program just two years ago and its partnership with customer SynOptics a year later. The company's regional sales manager, Scott Steward, figures the cost calculations are less important than the fact that "if we hadn't had the TQM program, SynOptics would not have picked us." Nonetheless, the synergy of the relationship has more than paid off in reduced defects—which have fallen 30% over a 14 month period, says former president Jim Barton.

Not only do we tell suppliers their defect rate per million, but also the cost to us, says SynOptics's Omanoff

As for SynOptics, founded in 1985 and already over $248 million in revenue, non-value-added inspection has been reduced by 40% over the last 18 months and the company calculates its supplier programs alone have saved at least $2.5 million in cost of goods sold. The company has always kept a close eye on costs. "We collect component failure data and do a cost analysis on the top 10," says Dennis Omanoff, quality director for SynOptics. "Most large suppliers are surprised when we tell them not only the defect rate per million, but also the cost to us each month."

A key to SynOptics's cost-savings drive has been to get its suppliers to plan new products together. For example, SynOptics brings its volume PCB supplier, Zycon Corp., and its niche supplier, Sigma Circuits, into the same room to make sure the two companies iron out possible manufacturing glitches early on in the planning stage. □

The synergy of the relationship has more than paid off in reduced defects, says Sigma Circuits' Jim Barton

gible quality metrics such as scrap, inventory carrying costs, and cycle time. Bauer's division maps its spending relative to five bottom-line measurements: profits, customer installed base, customer satisfaction, revenue growth, and market share. While profits are confidential for the division, the other four concepts rose 34%, 9%, 38%, and 18%, respectively, from 1988 to 1991. "Our quality initiative at Rochester has been that if what you're doing doesn't translate to the bottom line, then you have to rethink your priorities," says Bauer.

The debate remains a noisy one. "Implicit in this question is the fact that that executives should be concerned with the relationship between profitability and quality," says Carl Thor, former vice chairman of the American Productivity & Quality Center in Houston, TX. "I'm not sure that's necessarily true. Managers trying to prove the unprovable will end up with bad results."

Nonetheless, the research goes on. For example, there's a new, massive joint project between the American Quality Foundation (AQF) and Ernst & Young to try to quantify the causal relationship between quality investments and profits. Josh Hammond, president of AQF in New York City, contends that models linking quality and profits *must* be tested so executives can develop better maps with which to direct their quality initiatives.

Concrete results were not available at press time, but Hammond's report, *The Best Practices Report on International Quality*, is expected to be released this month. "It is going to make quality consultants uncomfortable, but it will give executives a way to focus their efforts and set priorities in their quality programs," claims Hammond.

Perhaps a revolution is underway in how companies measure their business performance. During revolutions—even the total quality management one—fights break out and communication breaks down. For now, anyway, the language of quality is certainly not the language of Wall Street. □

ABC management can help increase quality savings

ONE OF THE accounting revolutions taking hold among quality-driven electronics companies is something called activity-based costing (ABC). Traditional accounting methods assign manufacturing costs to products based on the product's labor content. ABC requires that managers look closely at *all* the activities a particular product actually consumes, including direct labor content, spare parts usage, or time spent setting up machinery.

Consider this oft cited example. In a paint-spraying part of an automobile assembly line, the cost of running the machinery is typically split equally among the number of cars sprayed. When the factory sprays six cars blue, then three red, and only one yellow, the spray guns are changed three times. Under ABC, that single yellow car actually carries the burden for fully one-third of the extra expense to change the guns. Thus, the blue cars cost less to manufacture than the lone yellow car.

Varian Associates Inc. is one of many high-tech companies now experimenting with ABC. By distinguishing between indirect activities that add value and those that don't, the company's strategic decision-making is now more sophisticated, says Richard M. Levy, executive vice president for Varian. "In the instruments division, for example," says Levy, "we realized one product line, which was a smaller portion of our business, actually contributed more to profits and that changed our strategy."

This may sound easy, but it's not. ABC is not about developing a more accurate way to allocate costs. It is about analyzing the resources needed to make products in order to make better management decisions about how to grow profits, explain professors Robert Kaplan and Robin Cooper of Harvard Business School, the acclaimed experts on the subject. For executives who have already adopted the continuous improvement philosophy, ABC helps explain how and why those management changes can be so profitable.

"Quality purists don't like ABC," says consultant Carl Thor. "I'm overstating perhaps, but the only thing that counts to them is physical, not financial, data." ABC, however, may just be the tool to help bridge the gap between the language of quality and the spreadsheets of finance. At the very least, adds Tom Ashburn of Hewlett-Packard Co., ABC does help you to "sharpen your pencil."

For more information about ABC, see Kaplan's and Cooper's book *The Design of Cost Management Systems* (Prentice-Hall, 1991). For how-to seminars on ABC, call the American Productivity & Quality Center at (800) 776-9676. □

Industry to B schools: Smarten up on TQM or else

Companies say business schools better get quality into their curricula or their graduates won't get work

By Barbara Jorgensen

Howard Wilson is unhappy with the quality of some of his purchased goods lately. "Supplier quality is imperative to the success of our own quality efforts," says Wilson, director of market-driven quality for IBM. "If we have to inspect and retrofit even *some* of our suppliers' parts, it's expensive, and our products [become less than] world class."

Wilson isn't talking about microprocessors or cable assemblies, but about the hundreds of new MBAs that Big Blue must retrain every year because so many American business schools pay little more than lip service to the principles of total quality management, or TQM. As a result, says Wilson, IBM—a 1990 winner of the Malcolm Baldrige National Quality Award—coughs up more than $1 billion annually for worker training.

Things aren't much better at Motorola, which now spends an estimated $70 million annually on employee training—half of it quality-related. "We've found graduates who are unable to work as part of cross-functional teams," complains Motorola's Jim Robertson, manager of instructional development for quality. Students also are poorly trained in concurrent engineering and design for manufacturability, he says, and are often unaware of the practical ways in which design impacts product cost.

There's plenty of blame to go around. Executives admit they haven't always communicated their quality requirements to the nation's business schools, even though many companies—including IBM, Motorola, and Xerox—are well-equipped through experience to impress schools with the need for TQM methods.

That's changing. More and more companies are sending business schools the message that MBAs who are not trained in TQM may be passed over for recruitment.

"You have to create a crisis," says Wilson, recalling IBM's own market-share crisis that pushed the company into TQM. "We're telling colleges and universities that students should be coming to us with TQM concepts ingrained."

To help reach that goal, industry is increasingly reaching out to schools to drive home the need for TQM in the classroom. Reams of academic applicants, for example, have signed up for an IBM grant program and for the so-called TQM University Challenge (see "Industry pitches in to bring quality to the classroom").

Although joint company/university TQM programs have been directed mainly at graduate schools, long-term plans call for teaching quality techniques at the undergrad, vocational, and K-12 level as well. "Most of the people we hire for the manufacturing line don't have college degrees," says IBM's Wilson. "But they have to accept the mindset of TQM just as much as an MBA."

AT LEAST SOME schools are getting the message. "Since we're suppliers to corporations, we need to provide them with what they want," says professor Ash Rao at Babson College in Wellesley, MA.

The results so far have been promising, though hardly revolutionary. At the very least, industry is beginning to make some con-

verts among the academic rank and file. Recalling his participation in a Xerox-sponsored TQM program, Don Hale, public-relations administrator at Carnegie-Mellon University in Pittsburgh, admits "I was a skeptic. This thing had a faddish side." What changed his mind was watching Xerox personnel work among themselves and with Hale's group. "It impressed the hell out of me," he says.

To be fair, many U.S. business schools have come a long way in the past few years. Academic and industry sources claim that exceptional TQM curricula are offered by the universities of Chicago, Tennessee, Miami, New Mexico, Maryland, and Illinois, as well as by Oregon State, Fordham, MIT, and Columbia. Overall, though, the news at 1991's Total Quality Forum in Cincinnati wasn't good: Fewer than 5%—and perhaps as little as 1%—of about 600 U.S. business schools have been affected by the quality revolution that is driving change in U.S. and worldwide businesses, said keynote speaker Robert Kaplan, a professor in Harvard University's Graduate School of Business Administration (see "Quality gets short shrift at top U.S. business schools").

One problem is that universities encourage individual performance rather than teamwork

That helps explain industry's concerted push to integrate quality into colleges. In too many quality-driven organizations, says Maria Huang, customer-driven quality director at S-MOS Systems in San Jose, managers must "unteach" what MBAs are taught in school—to be in charge, to be in control, and to be sole decision-makers. Executives argue that the responsibility (not to mention some of the cost) of training the next pool of labor in TQM should shift from the corporation to the campus.

Why has TQM been so slow to migrate from industry to the campus? One reason: Like Carnegie-Mellon's Hale, many academics still see TQM as a fad or buzzword. And since quality isn't usually considered a research topic, few incentives exist for staff to pursue it as a discipline. TQM's cross-functional nature also works against its acceptance, since the university environment encourages individual, rather than group, performance. When S-MOS Systems' Huang pursued her master's degree, for example, she steered away from an MBA. "[Management] schools teach you to organize, but they also teach you to control," she says. "In quality, you have

How your company can make a difference

GIANTS such as Motorola and IBM are powerful enough to influence how quality is taught in universities, but most electronics companies earn less than $100 million in revenue. Yet even the smallest company can influence the adoption of quality practices in the nation's schools, says Eve Majure, senior manager of university programs for the American Electronics Association (AEA):

- Invite a faculty member to one of your company's TQM courses;
- "Adopt" a faculty member and start a mentor program based on continuous exposure to TQM principles;
- Encourage management to make the faculty/mentor relationship part of employee responsibility, not something to be done on workers' own time;
- Encourage your CEO to partner with other top execs and visit a local university president, as former Xerox CEO David Kearns did with the University of Maryland. TQM integration, notes Majure, is only as good as the commitment at the top;
- Encourage engineering and business schools to work on cross-functional TQM together. IBM's grant program specifies joint business/engineering projects as a condition of the award;
- Encourage a system that awards tenure based on TQM implemented in courses and in the organization;
- Work with universities that commit to integrating TQM as a required course;
- Help to design and critique course plans;
- Make it clear to college employment liaisons that a background in TQM will be mandatory if their graduates are to be hired;
- Notify schools that they and their graduates will be assessed on the basis of their commitment to quality;
- Emphasize that research grants will be awarded on the same basis.

Majure notes that the AEA has been working with the industry since 1981 to improve engineering education through foundations, grants, and fellowships for students and faculty at all levels. □

to let go of control and learn to empower employees."

The teaching of quality also proves confounding. "The problem with TQM is that you can't pull out a book and teach it—it's a philosophy," says Tom Brady, assistant director at the Center for the Management of Manufacturing Enterprises at Purdue University in West Lafayette, IN, which is implementing a TQM curriculum with Motorola's help. "Going to Motorola was a good experience, but not everyone's convinced that what's good for Motorola is good for Ford and so on. It's tough to agree on just what to teach."

In contrast to most companies, TQM implementation even differs within a given university. Indeed, engineering and business schools often teach TQM in their own vertical "silos," neglecting the cross-functional training that is at the heart of TQM. James Bonini, a graduate of MIT's Leaders for Manufacturing program in Cambridge, points out that the

Industry pitches in to bring quality to the classroom

SEVERAL U.S. corporations are working with the nation's universities and grade schools to teach and implement TQM. In August 1991, for example, former Motorola chairman Robert Galvin issued the TQM University Challenge at the annual Total Quality Forum, hosted by Procter & Gamble in Cincinnati.

The challenge urged universities to integrate TQM principles into their curricula and their own operations, with the help of 5 participating companies. Motorola was matched up with Purdue University, Procter & Gamble with the University of Wisconsin at Madison and Tuskegee University, Xerox with Carnegie-Mellon University, Milliken with North Carolina State University and the Georgia Institute of Technology, and IBM with MIT and Rochester Institute of Technology.

The challenge required that the college conduct an internal quality assessment, much like the Baldrige; that it perform a "customer survey" to determine who its customers are, how to survey them, then gear itself toward customer service; and, by June 1993, that it develop a TQM curriculum integration plan to be implemented by September 1993.

Each company sponsored a week of onsite education for engineering, business, and administrative personnel from its university match. Costs were covered by the companies. These were completed in the spring, and universities now are forming internal steering committees and following up with their corporate partners.

Robert Sullivan, dean of Carnegie-Mellon's Graduate School of Industrial Administration, attended Xerox's program, which was modified to apply to a university. TQM was already being taught, says Sullivan, and the university was looking for a way to include TQM across-the-board. "We got some good ideas for the curriculum," he says, "but we also found out how to effect things outside the classroom." Orientation for incoming graduate students, for example, now includes problem solving and interactive projects. By applying TQM principles throughout the university as well as in the classroom, Sullivan believes TQM will be constantly reinforced.

Out of the TQM University Challenge sprang a number of subcommittees, one of which is the Employers' Needs Working Council. The council's charter is to gauge TQM needs and expectations throughout all areas of employment—industry, government, health, services, and manufacturing. The committee, comprised of CEOs and university heads, will try to assess what employers want from graduates. A report will be issued at the next TQM Forum, hosted by Procter & Gamble, in November.

Another industry-university effort is a $1 million grant from Florida Power & Light (the first U.S. Deming Award winner) to the University of Miami to set up a TQM program; the university formed the Institute for the Study of Quality in Manufacturing. The school now offers TQM education modules, incorporated into seven business and engineering courses, that apply TQM principles to the topic being studied. The university also has been researching the need for a TQM master's degree program.

Finally, IBM's TQM Competition will award either $1 million in cash or $3 million in equipment to eight universities who demonstrate TQM integration across disciplines; accelerated research on quality; plans to implement TQM concepts in administration and operations; institutional commitment for funding, personnel and outside support, and propagation/sharing with other colleges and universities. □

program—which applies TQM to its own operations as well as teaching it—differs from the rest of MIT's Sloan School of Management. "TQM means we need a cross-functional mindset," he says. "Instead, the mindset is 'divide and conquer.' "

Engineering schools, for example, teach such TQM tools as statistical process control (SPC), quality function deployment (QFD), and shop-floor quality methods. But such tools don't change a company's culture, says Dartmouth College professor Luigi D'Angola, they only improve methodology.

Management schools, meanwhile, need to examine accounting systems such as activity-based costing to permit cross-functional design work and to trace the impact of design decisions, says Motorola's Robertson.

Just what does business want from the schools? For starters, says IBM's Wilson, TQM must be part of required, not elective, course work. Jim Lynch, director, strategic planning and quality deployment for Sun Microsystems Inc., and chairman of the American Electronics Association's National Total Quality Commitment Committee, says TQM should be as pervasive as other basic skills.

"We take math and composition for granted at Sun," says Lynch. "The same should be true for quality. My fear is that with the 50-year head start the Japanese have on quality, they'll find a way to make it pervasive through their culture as well as through their companies."

Moreover, Lynch adds, the new MBA should be a generalist, not a specialist. Since quality is increasingly customer-centered, employees must possess a set of four basic skills:

- Listening to the customer, then quantifying, developing, designing, and delivering to the customer's specifications;
- "Management by fact"—i.e., management based on decisions driven by analytical, objective methods;
- The ability to work effectively in a cross-organizational approach rather than in vertical engineering or management silos;
- Adaptability to change in mindset, skills, and traditional management roles.

Cindy Charles

"We take math and composition [among graduates] for granted," says Sun Microsystems' Jim Lynch. "The same should be true for quality"

Quality gets short shrift at top U.S. business schools

(Ranked best to worst, school year '90-91)

No. of schools	Course data
1	3 to 4 weeks of a 10-week course are devoted to quality
1	5 of 20 sessions cover quality
1	6 of 42 sessions devoted to quality
1	Multiple electives on quality offered
12	1 elective on quality management offered
15	3 or fewer sessions spent on quality; courses run 13 to 28 sessions

19 responses, data above overlaps

Source: Robert Kaplan, Harvard University

COLLEGES AND universities are heeding these calls for TQM for the same reason business did almost a decade ago: competition. "You need [TQM programs] to gain credibility, especially if a company like Motorola is saying 'we won't hire your students,' " says Purdue's Brady. "That matters to us. And if students see that, they won't enroll here."

Nathan Stuart, a graduate of MIT's Leaders program, says the TQM skills he learned there were "a significant plus, a skill worth promoting" when he was being recruited by his current employer, Eli Lilly.

Ultimately, say the optimists, these efforts could lead to the development of the "American way" in TQM, not an imitation of the Japanese. "There's an enormous amount of good stuff being done in the U.S.," says Dartmouth's D'Angola. "It's possible that someday we could leapfrog the Japanese." □

Recession walloped Asia's electronics industry too

The downturn in Japan slashed net income at top Asian companies by 24% in '91. This year's sales are expected to remain flat

By Paula Doe

About the best that can be said about Asian electronics companies in 1991 is that they fared better than their U.S. counterparts.

Thanks to a healthy first half, before the recession hit Japan and the rest of the Far East, total electronics sales by the top 50 Asian companies grew by 4%; sales by the top 50 U.S. electronics companies remained essentially flat. But the downturn in the second half of 1991 sent Asian net income plunging 24% for the year—not nearly as bad as the 59% earnings freefall at the U.S. top 50, but enough to trim Asian margins to the same slim 2% for the top U.S. companies. The outlook for Asian electronics in '92: no more damage, probably, but nothing that looks like a recovery, either.

The story of the top Asian electronics companies is the story of Japanese electronics; indeed, ranking top Asian companies shows how thoroughly Japan still dominates the industry in the Far East. Hong Kong-based *Electronic Business Asia* reports that total electronics sales by the 50 top Asian non-Japanese electronics companies come to a mere $26 billion. When Japanese companies are included, the total for the 50 top Asian companies is $322 billion.

The only non-Japanese companies big enough to make the $1 billion or so cutoff for this year's list are the four Korean conglomerates—Samsung Electronics, Goldstar Co., Daewoo Electronics, and Samsung Electron Devices, all of which bucked the Japanese downturn to turn in hefty growth rates. Taiwan's Acer Inc., with sales of $981 million, and Tatung Co., at $794 million, also came close to making this year's top 50.

The story in Japan was grim. Exports were hit by the high yen and the U.S. recession. The collapse of the bubble economy in Japan forced companies to slow their investments in computers and equipment and consumers to cut spending on electronic gadgets. Demand collapsed in the fall of 1991, leaving companies with six dismal months before they closed their books in March.

Many leading companies saw their profit margins plunge even further than the top 50's total 21% drop in operating income. Things were so bad in the second half of the year that, in spite of the relatively healthy first half, a host of leading companies saw their 1991 operating incomes plummet more than 40%. NEC Corp., for example, suffered a 43% decline. Others include Toshiba Corp. (-55%), Sony Corp. (-44%), Ricoh Co. (-68%), and Oki Electric (-66%).

A few companies did well. Nintendo Co. maintained 19% growth in sales and jumped 26% in net income as it kept the video-game business going strong for yet another year. Casio Computer Co. saw a 14% increase in sales and a 15% improvement in net income, thanks to strong sales of electronic musical instruments and office equipment. Ceramics maker Murata Manufacturing Co. managed net margins of 9.7%. And Fujitsu Ltd. saw a big 16% sales growth thanks to strong computer sales, though its net income plummeted a whopping 85%. □

Even in a bad year, Asia tops U.S. in electronics

	Asia's top 50		U.S.'s top 50	
	$ billions*	% change '90-'91**	$ billions*	% change '90-'91**
Electronics sales	$322.3	4.2%	$295.1	0.3%
Total sales	623.2	4.9	670.9	-2.8
Net income	13.7	-23.7	12.8	-59.1

*$1=Y133/733 Korean won
**Measured in local currency

How the top 50 measure up

	Asia	U.S.
Net income/sales	2.2%	1.9%
Return on equity	3.6	6.1
Return on investment	1.9	4.5
Debt/total capital	47.9	31.0
Foreign sales/total sales	41.0	35.0

Source ELECTRONIC BUSINESS

Rank 1991	Rank 1990	Company	Electronics sales ($ millions)	% change ('90-'91)	Total sales ($ millions)	% change ('90-'91)	Operating income ($ millions)	% change ('90/'91)
1	1	**Matsushita**	$36,638	4	$56,014	13	$2,925	-18
2	2	**NEC**	28,375	2	28,375	2	913	-43
3	3	**Toshiba**	26,602	0	35,507	1	891	-55
4	5	**Fujitsu**	25,879	16	25,879	16	988	-33
5	4	**Hitachi**	25,169	4	58,388	0	2,647	-30
6	6	**Sony**	22,959	6	28,734	6	1,250	-44
	7	**NTT**	16,379	3	48,108	2	4,274	-9
8	8	**Canon**	13,771	8	14,052	8	1,038	-13
9	9	**Mitsubishi Electric**	12,510	0	25,137	1	1,103	-30
10	10	**Sharp**	9,704	0	11,691	1	463	-19
11	–	**Samsung Electronics**	7,131	16	7,131	16	907	56
12	11	**Ricoh**	6,655	1	7,650	1	84	-68
13	12	**Sanyo**	6,060	7	11,933	8	372	2
14	13	**Oki Electric**	5,122	3	5,122	3	76	-66
15	–	**Goldstar**	5,025	23	5,025	23	460	18
16	14	**Pioneer**	4,609	2	4,609	2	433	-20
17	16	**Nintendo**	4,224	19	4,224	19	1,109	7
18	15	**TDK**	4,022	-1	4,022	-1	406	-21
19	19	**Omron**	3,633	4	3,633	4	188	-45
20	17	**Alps**	3,469	0	3,469	0	142	-21
21	18	**Nippondenso**	3,397	-2	11,138	-2	495	-39
22	20	**Toyota**	2,964	NA	74,099	7	3,758	-22
23	21	**Kyocera**	2,959	-3	3,410	-2	318	-24
24	24	**Casio**	2,883	14	2,883	14	158	13
25	22	**Citizen**	2,757	0	3,100	1	213	-22
26	26	**Seiko****	2,446	0	3,218	0	118	-32
27	25	**Minolta**	2,356	-4	2,678	-4	-26	NM
28	28	**Murata**	2,109	1	2,109	1	335	-1
29	23	**Fuji Electric**	2,074	4	6,837	8	315	2
30	31	**Nissan**	1,850	NM	48,255	8	1,102	16
31	32	**Kenwood**	1,821	10	1,821	10	68	16
32	34	**Ryosan**	1,693	7	1,693	7	60	40
33	33	**Konica***	1,678	4	4,195	4	192	-6
34	35	**Japan Radio**	1,630	5	1,630	5	116	-12
35	29	**Nikon**	1,618	-10	2,048	-11	98	-59
36	37	**Olympus**	1,565	5	1,956	5	104	-45
37	41	**Rohm**	1,541	8	1,541	8	172	101
38	27	**Matsushita Electronic Works**	1,541	1	8,104	5	703	0
39	38	**TEL**	1,483	NM	1,483	NM	115	NM
40	36	**Yamaha**	1,465	5	3,856	1	142	12
41	30	**Yokogawa Electric***	1,419	6	1,981	6	75	37
42	40	**Honda**	1,387	1	33,022	2	1,153	4
43	42	**Clarion**	1,352	NM	1,388	NM	-19	NM
44	45	**Mitsumi Electric**	1,343	13	1,343	13	66	35
45	43	**Shimadzu**	1,290	2	1,466	2	83	0
46	39	**Fanuc***	1,203	-18	1,203	-18	293	-43
47	–	**Daewoo Electronics**	1,183	20	2,151	20	173	23
48	–	**Samsung Electronic Devices**	1,140	18	1,140	18	83	2
49	46	**Sanshin Electronics**	1,118	1	1,118	1	32	-18
50	44	**Shin-Etsu Chemical**	1,076	3	3,597	2	343	-9

NA = not available
NM = not meaningful

* Preliminary estimate before final figures available.
** Figures for Seiko Corp. only. Does not include sales of separate, privately held affiliates Seiko Epson and Seiko Instruments.

Operating income as % of sales	Net income ($ millions)	% change ('90-'91)	Net income as % of sales	Return on equity	Return on investment	Debt as a percentage of total capital	Foreign sales as a percentage of total sales	Fiscal year ended
5.2%	$999	-49	1.8%	3.8%	2.1%	44.0%	48%	3/92
3.2%	115	-72	0.4%	1.7%	1.7%	NA	21%	3/92
2.5%	297	-67	0.8%	3.3%	3.3%	NA	29%	3/92
3.8%	92	-85	0.4%	NA	NA	NA	30%	3/92
4.5%	959	-45	1.6%	4.4%	4.4%	NA	24%	3/92
4.4%	903	3	3.1%	7.8%	3.9%	49.7%	75%	3/92
8.9%	1,436	-19	3.0%	4.5%	2.3%	48.0%	NA	3/92
7.4%	392	-15	2.8%	7.8%	3.7%	52.5%	69%	12/91
4.4%	271	-55	1.1%	4.4%	4.4%	NA	21%	3/92
4.0%	294	-17	2.5%	NA	NA	NA	50%	3/92
12.7%	94	-5	1.3%	NA	NA	NA	58%	12/91
1.1%	15	-85	0.2%	NA	NA	NA	NA	3/92
3.1%	127	-4	1.1%	2.3%	1.2%	47.1%	41%	11/91
1.5%	-4	NM	-0.1%	-0.3%	-0.1%	69.6%	30%	3/92
9.2%	25	-45	0.5%	NA	NA	NA	51%	12/91
9.4%	214	-17	4.6%	8.6%	8.6%	NA	59%	3/92
26.3%	655	26	15.5%	NA	NA	NA	NA	3/92
10.1%	162	-24	4.0%	5.6%	4.2%	24.6%	51%	3/92
5.2%	46	-71	1.3%	NA	NA	NA	21%	3/92
4.1%	55	-12	1.6%	NA	NA	NA	NA	3/92
4.4%	457	-4	4.1%	8.3%	6.0%	27.4%	21%	12/91
5.1%	3,244	-2	4.4%	NA	NA	NA	NA	6/91
9.3%	204	-16	6.0%	5.3%	4.8%	9.6%	53%	3/92
5.5%	79	15	2.7%	6.6%	3.1%	53.4%	60%	3/92
6.9%	105	-19	3.4%	8.7%	8.7%	NA	NA	3/92
3.7%	-17	NM	-0.5%	NA	NA	NA	NA	3/92
-1.0%	-271	NM	-10.1%	-51.2%	-24.6%	51.9%	78%	3/92
15.9%	204	8	9.7%	8.4%	7.1%	16.2%	43%	3/92
4.6%	126	-24	1.8%	9.4%	9.4%	NA	9%	3/92
2.3%	762	107	1.6%	NA	NA	NA	NA	3/92
3.7%	15	-10	0.9%	3.6%	1.5%	58.1%	68%	3/92
3.6%	33	4	1.9%	6.7%	4.4%	33.8%	5%	9/91
4.6%	11	45	0.3%	NA	NA	NA	NA	4/92
7.1%	44	-20	2.7%	7.2%	3.5%	51.3%	25%	3/92
4.8%	40	-69	2.0%	3.4%	1.9%	44.5%	54%	3/92
5.3%	38	-31	2.0%	NA	NA	NA	NA	3/92
11.2%	55	36	3.6%	4.2%	2.8%	32.1%	33%	3/92
8.7%	262	5	3.2%	8.0%	4.4%	45.4%	6%	11/91
7.8%	63	NM	4.2%	5.8%	5.8%	NA	NA	3/92
3.7%	43	-25	1.1%	3.5%	2.1%	40.2%	37%	3/92
3.8%	56	0	2.8%	NA	NA	NA	NA	3/92
3.5%	488	-15	1.5%	5.9%	2.9%	51.4%	68%	3/92
-1.3%	-43	NM	-3.1%	-10.6%	-4.5%	57.4%	32%	3/92
4.9%	22	90	1.6%	10.9%	4.2%	61.3%	44%	1/92
5.6%	44	-5	3.0%	NA	NA	NA	NA	3/92
24.4%	227	-25	18.9%	NA	NA	NA	NA	3/92
8.0%	19	6	0.9%	NA	NA	NA	64%	12/91
7.3%	36	-14	3.2%	NA	NA	NA	88%	12/91
2.8%	9	-21	0.8%	5.0%	2.2%	56.1%	6%	9/91
9.5%	185	-7	5.1%	10.1%	5.9%	41.6%	27%	3/92

All figures are consolidated.

Percentage change is calculated in local currency.

$1=133 Japanese yen, 733 Korean won. Those companies whose fiscal years ended other than March 1992 may use different rates in their own reporting.

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VIEWPOINT

Are we falling out of love with TQM?

IS U.S. INDUSTRY falling out of love with quality improvement programs? Let's hope not. Now would be the worst of all times to be fickle. For one thing, U.S. industry's reputation for producing high-quality products has just started to rebound. For another, too many companies aren't yet aggressively seeking to improve quality. These folks need to smarten up.

There is even some grumbling that legendary Japanese quality is slipping as a result of the sudden financial pressure on Japan's electronics industry. Before you laugh at that, consider that Matsushita reported its pretax profit fell 62% for the quarter ended last June; and its consumer subsidiary, JVC, announced it would cut 3,000 workers as a result. Sony and Toshiba are feeling the same pressure.

The truth is that the U.S. is making substantial progress in improving the quality of U.S. goods *and* organizations. To slow that progress now by reducing our commitment to total quality management (TQM) programs would be a colossal mistake.

Two of the biggest lightning rods for critics of U.S. quality improvement efforts are the Malcolm Baldrige National Quality Award and the absence of a clear financial return on quality. No doubt, some of the Baldrige criticism is justified. It's not necessarily a flop as an award, but it's not a grand success, either. Indeed, "picking winners" may not always be a good idea, although doing so is a good match with the U.S.'s competitive ethos. What is clear, however, is that Baldrige Award criteria comprise an excellent tool for improving quality. Roughly 50,000 Baldrige applications have been distributed to companies, and about 10,000 TQM presentations have been given to companies by Baldrige examiners and winners.

The second big problem is the need for the top brass to see clear bottom-line payoffs from TQM—a worthy task, but one that's difficult to accomplish. It's relatively easy to show cost savings from reduced scrap and the like. It's much harder to directly link increased sales, improved profits, or increased market share to ongoing quality efforts. For these reasons, too many companies aggressively pursue early TQM efforts but then slack off because they can't quantify the continued payback.

Let's not be deflected by these and other concerns. The biggest reason to continue to embrace the quality revolution is that it works. It's the only way to succeed in today's global market. Let's not mess up.

—John Russell, editor

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